

XII. *Studies of the Blattidae.* By the late R. SHELFORD,
M.A.

[Read June 5th, 1912.]

PLATES LXXIX—LXXX.

A REVISION OF THE GENUS *THEGANOPTERYX*, BR., TO-
GETHER WITH REMARKS ON SOME SPECIES OF
HEMITHYRSOCERA, SAUSS.

THE great numbers of obscure and still undescribed species of cockroaches belonging to the subfamilies *Ectobiinae* and *Pseudomopinae* have convinced me that much more accurate and detailed diagnoses of genera must be drawn up if any order is to be introduced into the chaos at present existing. This is a task of no mean difficulty, for whilst the differences between the males of the various species are patent enough, the females resemble each other very closely, and the presence of characters which will enable the entomologist to brigade the species into genera can only be demonstrated after the most meticulous examination of all the external anatomy of the insects. But a still greater difficulty confronts the student. The characters hitherto employed to separate the subfamilies *Ectobiinae* and *Pseudomopinae* are so variable and so interchangeable that the allocation of a species or genus to this subfamily or that is as often as not dependent almost entirely on the personal opinion of the entomologist. So intimately do the subfamilies interlock that more than once I have considered the advisability of merging the two subfamilies, and I think that I would do so had I not a lingering conviction that further study of the species, both described and undescribed, will bring to light some really reliable diagnostic characters. Not one of the characters usually employed to distinguish the *Ectobiinae* from the *Pseudomopinae* is peculiar to the former subfamily. The transverse supra-anal lamina of the male, the sparse armature of the femora, the well-defined apical triangle of the wings occur sporadically in the *Pseudomopinae*. When these three important characters are shown by one species it is

easy to recognise that species as a typical Ectobiine. But what of the species that exhibit, let us say, two of the above-mentioned features, whilst the third character is typical of the *Pseudomopinae*? It is true that the *Ectobiinae* as a whole have a general facies which enables the expert to recognise them almost at a glance, but it is impossible to define this facies in cut-and-dry phrases. For example, it would be folly to remove "*Theganopteryx*" *malagassa* Sauss., from the *Ectobiinae*, or the two species of *Chrastoblatta* from the *Pseudomopinae*. Yet in the former species the apical triangle is not sharply marked off from the rest of the wing, and the two latter species have the femora most sparsely armed. Quite apart from this difficulty of expressing in words the Ectobiine facies, there is the difficulty of placing the genera which present neither an Ectobiine nor a Pseudomopine facies; these baffle even the specialist. *Mallotoblatta*, Sauss., and *Escala*, mihi are cases in point,* they present some Ectobiine characters but do not look like *Ectobiinae*, and to include them in the *Ectobiinae* renders a diagnosis of the whole subfamily more difficult than ever, and the same happens if they are included in the *Pseudomopinae*.

It is perhaps the irony of fate that in this, my last serious contribution to the taxonomy of the Blattidae, I feel compelled to recant some of the opinions expressed in my first essay on the same subject. In that paper (Trans. Ent. Soc. London, 1906) I, with all the rashness of inexperience, rushed in where such authorities as Brunner von Wattenwyl and de Saussure had feared to tread, and declared with no uncertain voice that the simple or bifurcate ulnar vein of the wing was a character of the greatest reliability whereby to separate the *Ectobiinae* from the *Pseudomopinae*. The position cannot be held. Reliance on this character involved the removal of *Hemithyrsocera* from the *Pseudomopinae* to the *Ectobiinae*, but further knowledge has shown me that its genus is akin to *Blattella*, in fact the two genera grade into each other. Moreover, when the wings of a cockroach become reduced in size or semi-aborted the first wing-veins to disappear are the branches of the ulnar vein, consequently nearly all the species of *Ceratinoptera*, a truly typical

* It is some comfort to know that de Saussure was evidently as puzzled about the correct systematic position of *Mallotoblatta* as I am.

Pseudomopine, would, following my erroneous views, fall into the *Ectobiinae*. It is perfectly true that the simple or bifurcate ulnar vein of the wings is an Ectobiine character, there being but few exceptions (*Anaplectoidea* and one or two species of *Anaplecta*), but it occurs so often amongst the *Pseudomopinae*, that taken by itself it has no great diagnostic value.

It was my intention to write a complete revision of the Ectobiine genera, but circumstances over which I have no control prevent me from accomplishing this piece of work, either now or in the future, and I must content myself with giving a definition of the *Ectobiinae*, a revision of one characteristic Ectobiine genus, *Theganopteryx*, Br., and descriptions of a few critical species of *Hemithyrsocera*, Sauss. I hope that my researches will enable other orthopterists to recognise clearly the differences which separate the two genera—a point in classification which was never very clear before, and by that means to discern the characters of the two subfamilies to which the two genera belong.

i. DIAGNOSIS OF THE SUB-FAMILY ECTOBIINAE.

Fully winged, or tegmina and wings reduced, or aborted, or absent. Sexes similar or dissimilar. Vertex of head not covered by pronotum, which is transversely elliptic or trapezoidal. Tegmina with discoidal sectors longitudinal or oblique. Wings nearly always with simple or bifurcate ulnar vein; a triangular apical area is invariably present except in those forms in which it has developed into a large apical field, reflected when the wing is folded; the triangular apical area is typically defined very clearly and easily distinguished from the rest of the wing. Supra-anal lamina of the male generally short and transverse. Subgenital lamina of the male and the styles generally asymmetrical. Femora usually very sparsely armed. Oötheca chitinous and carried with the suture uppermost.

ii. REVISION OF THE GENUS THEGANOPTERYX, Br.

I was led to a revision of this genus by an examination of its type, *T. lucida*, Br., which was kindly lent to me with several others by Dr. Dohrn of the Stettin Museum. The type has lost its abdomen and never was provided with a locality label, for the describer hazarded the opinion that the species came from Australia. On seeing

the specimen I recognised its identity with a long series of the same species in the Genoa Museum collection, then in my hands, which came from West Africa, and I have no doubt that Brunner's type was taken, as were many other species in the Stettin Museum described by the same author, in Old Calabar. The genus being a critical one I made a very careful examination of the type and of the Genoa specimens, and in course of time arrived at the conclusion that the genus was far more limited in scope and in its geographical distribution than had been supposed by the authors who followed Brunner. *Theganopteryx* is in fact confined, so far as our present knowledge goes, to Tropical Africa. The majority of species which by other authors as well as by myself have been referred to this genus belong in reality to the almost cosmopolitan genus *Hemithyrsocera*, Sauss., but for the Malagasy species of *Theganopteryx* I have recently erected the new genus *Eutheganopteryx*. In the following revision I have thought it advisable to describe at some length every species of the genus, it is certainly convenient to have under one cover a complete conspectus of a genus.

Genus THEGANOPTERYX, Br.

Theganopteryx, Brunner v. Wattenwyl, Nouv. Syst. d. Blatt., p. 53 (1865); Saussure, Mém. Soc. Sc. Phys. Nat. Genève, xx, p. 229 (1869); Saussure and Zehntner, Biol. Centr.-Amer. Orth., i, p. 16 (1893).

Sexes similar. Antennae setaceous. Pronotum trapezoidal. Tegmina extending beyond the apex of the abdomen; costals regular, radial vein simple, discoidal sectors longitudinal, anterior ulnar usually simple, posterior ulnar multiramose. Wings fully developed; mediastinal vein 3-5-ramose, rarely simple, costals regular, incassated, radial vein simple, ulnar vein simple or bifurcate running close to the vena dividens, the interspace seldom crossed by transverse venules, its apex bent up and frequently failing to reach outer margin of wing impinging on the boundary of the apical triangle, medio-discal area 3-4 times broader in the middle than the medio-ulnar area. Triangular apical area well-defined, prominent, clearly marked off from rest of wing. Supra-anal lamina variable but typically trigonal. Sub-genital lamina (♂) more or less asymmetrical. Femora moderately armed beneath; front femora on the anterior margin beneath armed according to

Type B. Tarsi long, posterior metatarsi longer than the succeeding joints.

Type of the genus—*T. lucida*, Br.

Distribution of the species—WEST AFRICA, Congo region and N.E. Rhodesia.

KEY TO THE SPECIES.

1. Unicolorous, testaceous or castaneous.
 2. Eyes close together on vertex of head (almost touching in ♂). *T. fantastica*, Shelf.
 - 2'. Eyes not close together on vertex of head.
 3. Species barely exceeding 10 mm. in length. *T. camerunensis*, sp. n.
 - 3'. Species much exceeding 10 mm. in length.
 4. Uniform castaneous *T. nitida*, Borg.
 - 4'. Uniform testaceous *T. obscura*, Shelf. (♂).
- 1'. Not unicolorous.
 2. Pronotum without darker vittae.
 3. Pronotum unicolorous *T. obscura*, Shelf. (♀).
 - 3'. Pronotum not unicolorous but piceous, marginal with hyaline *T. gambiensis*, Shelf.
 - 2'. Pronotum with 2 castaneous vittae or blotches.
 3. Pronotum with 2 castaneous blotches at base. *T. affinis*, sp. n.
 - 3'. Pronotum with 2 castaneous vittae.
 4. Tegmina uniform testaceous *T. rhodesiae*, sp. n.
 - 4'. Tegmina not uniform testaceous.
 5. Apex of anal field of tegmina hyaline; sub-genital lamina (♂) scarcely asymmetrical *T. notata*, sp. n.
 - 5'. Anal field concolorous; sub-genital lamina (♂) very asymmetrical *T. lucida*, Br.

Theganopteryx fantastica, Shelf. (Plate LXXIX, fig. 1.)

Theganopteryx fantastica, Shelford, Mem. Soc. españ. Hist. Nat. i, No. 27, p. 476 (1909).

♂. Pale flavo-testaceous. Head and antennae unicolorous; eyes piceous, almost touching on vertex of head. Pronotum unicolorous.

Tegmina with 19 costals, radial and anterior ulnar veins simple, posterior ulnar 5-ramose. Wings hyaline, costal margin faintly suffused with flavid, mediastinal vein simple, 18 costals the more proximal slightly incrassated, medio-discal area nearly four times broader in the middle than the medio-ulnar area, crossed by about 13 transverse venules, a prominent apical triangle, 1st axillary 4- to 5-ramose. 1st abdominal tergite produced as a flat narrow process extending nearly to the apex of the abdomen, grooved along its dorsal aspect and slightly spatulate at its extremity; 8th tergite depressed and punctate in the middle, the posterior angles triangularly produced. Supra-anal lamina quadrately produced, apex slightly bilobed, covering the bases of the cerci which are short and situated close together. Subgenital lamina produced, asymmetrical, apex concavely emarginate, two minute styles. Femora moderately armed, front pair with 3 stout spines on the anterior margin beneath, succeeded distally by piliform setae (Type B).

♀. Similar, eyes less close together on vertex of head. Wings, uniformly suffused with pale flavid. Supra-anal lamina produced, trigonal; subgenital lamina semi-orbicular, ample. Cerci longer not situated close together.

Total length (♂) 9 mm., (♀) 11 mm.; length of body (♂) 8.1 mm., (♀) 9.6 mm.; length of tegmina (♂) 7 mm., (♀) 9.5 mm.; pronotum (♂) 2.9 mm. × 3.2 mm., (♀) 3 mm. × 4.5 mm.

Hab. S.E. and N. KAMERUN (*Conradt*) (Berlin Mus., types; coll. Bolivar); BIAFRA, Cabo S. Juan (*Esealera*) (Madrid Mus.; Oxford Mus.).

Theganopteryx camerunensis, sp. n.

Differs from *T. fantastica* by the greater distance apart of the eyes in both sexes, the smaller size of the ♀, the absence of the process of the 1st abdominal tergite in the ♂. Colour and venation as in *T. fantastica*. Supra-anal lamina (♂) subquadrate, not strongly produced, apex emarginate, (♀) triangular. Subgenital lamina (♂) symmetrical, posteriorly concavely emarginate, two minute styles. Cerci short, fusiform, very broad at base with 8 visible joints in ♂, narrower and longer in ♀.

Total length (♂) 8.5 mm., (♀) 9 mm.; length of body (♂) 7.1 mm., (♀) 7 mm.; length of tegmina (♂) 7 mm., (♀) 7 mm.; pronotum 2 mm. × 3 mm.

Hab. S.E. KAMERUN (*Conradt*) (Berlin Mus., type ♂; coll. Bolivar, type ♀).

Theganopteryx affinis, sp. n.

♂. Closely allied to *T. fantastica*, but tegmina with anal field and a stripe on the discoidal field, castaneous; distance apart of eyes on vertex of head greater than the breadth of the 1st antennal joint; wings faintly suffused with castaneous, ulnar vein bifurcate, the rami joining again at their extremities. Secondary sexual apparatus of ♂ as in *T. fantastica*. Posterior angles of 8th abdominal tergite less produced; supra-anal lamina not sub-bilobate. Subgenital lamina symmetrical, apex concavely emarginate, two styles. Cerci narrower, situated less close together, their bases not hidden by the supra-anal lamina.

Total length 10·2 mm.; length of body 8·1 mm.; length of tegmina 8 mm.; pronotum 2·2·5 mm. × 2·5·3 mm.

Hab. CONGO STATE, W. of Kambove, 3,500'–4,500' (*S. A. Ncare*) (British Mus., type).

Theganopteryx nitida, Borg. (Plate LXXIX, figs. 2, 3.)

Theganopteryx nitida, Borg. Bih. Svensk. Vet.-Akad., Handl. xxviii, Afd. 4, No. 10, p. 4, pl. 1, fig. 8 (1904).

♂. Castaneous or rufo-castaneous, unicolorous. Antennae fuscous, not incrassated. Tegmina with 19–21 costals, radial and anterior ulnar veins simple, posterior ulnar 6-ramose. Wings suffused with castaneous, mediastinal vein 4-ramose, 21 costals, the proximal 16 slightly incrassated, medio-discal area in the middle about four times broader than the medio-ulnar area, crossed by 14 transverse venules, ulnar vein bifurcate, flexuose, reaching the outer margin, 1st axillary vein 7-ramose, triangular apical area large, prominent. Posterior margin of penultimate tergite sinuate; no scent-gland opening visible. Supra-anal lamina very asymmetrical, its posterior angles produced as two incurved hooks, the right overlapping the left. Subgenital lamina surpassing the supra-anal lamina, produced, asymmetrical, irregularly notched on the left side, apex with a blunt style. Cerci moderate, 9-jointed. Legs testaceous.

Total length 11·5 mm.; length of body 9 mm.; length of tegmina 9·8 mm.; pronotum 3 mm. × 3·1 mm.

Hab. KAMERUN (*Sjöstedt*, Stockholm Mus. type; *Conradt*, coll. Bolivar); BIAFRA, Cabo S. Juan (*Escalera*, Madrid Mus.).

Theganopteryx obscura, Shelf.

Theganopteryx obscura, Shelford, Rev. Zool. Afric. i, fasc. 2, p. 199 (1911).

♂. Uniform flavo-testaceous. Head castaneous, antennae fuscous; eyes piceous, their distance apart on vertex of head nearly equal to 1st antennal joint. Pronotum posteriorly produced very obtusely. Tegmina with 23 costals, radial and anterior ulnar veins simple, 7 discoidal sectors. Wings faintly suffused with ochreous, mediastinal vein simple, 15 costals, medio-discal area in middle about four times broader than medio-ulnar area, crossed by about 15 transverse venules, ulnar bifurcate, the rami joining at their apices, a prominent triangular apical area. Scent-gland openings on the 2nd and 7th abdominal tergites; supra-anal lamina trigonal, surpassed by the subgenital lamina which is produced, symmetrical, posteriorly emarginate and furnished with 2 minute styles. Cerci short, sub-acuminate, situated close together at base.

♀. Tegmina with the discoidal field and the disc of the abdomen beneath castaneous, supra-anal lamina triangular, cerci longer and more slender.

Total length (♂) 11·1 mm., (♀) 11·5 mm.; length of body (♂) 10 mm., (♀) 8·5 mm.; length of tegmina (♂) 9·1 mm., (♀) 9·1 mm.; pronotum 3 mm. × 3·5 mm.

Hab. CONGO STATE, West of Kambove, 3,500'–4,500' (S. A. Neave) (British Mus.), S.E. Katanga (S. A. Neave) (British Mus., Oxford Mus.), Kapema-Kipaila (Sheffield Neave) (Musée du Congo); N.E. RHODESIA, Serenje District (S. A. Neave) (British Mus.), Chisinga plateau (Oxford Mus., types); PORTUGUESE E. AFRICA, Kurumadzi River (C. F. Swynnerton, Oxford Mus.).

Theganopteryx gambiensis, Shelf. (Plate LXXIX, fig. 4.)

Theganopteryx gambiensis, Shelford, Trans. Ent. Soc. London, 1906, p. 236.

♂. Head castaneous; antennae fuscous, ciliate. Pronotum castaneous, anteriorly and laterally margined with testaceous. Tegmina and wings exceeding the apex of the abdomen. Tegmina flavo-hyaline, outwardly margined with hyaline, 10 costals the last two ramose, radial vein simple, anterior ulnar 3-ramose, 8 discoidal sectors. Wings with anterior part faintly suffused with castaneous, mediastinal vein 4-ramose, radial vein simple, 8–9 costals, slightly incrassated, ulnar vein bifurcate, the rami reuniting at apex, not

reaching the margin of the wing, medio-discal area a little more than twice as broad as medio-ulnar area crossed by a few transverse venules, triangular apical area very large, the vena dividens crossing it in the lower half, 1st axillary 3-ramose. Abdomen above piceous in basal half, the tergites margined laterally and posteriorly with testaceous, rufous in apical half; scent-gland opening on 7th tergite; supra-anal lamina trigonal. Abdomen beneath piceous, laterally margined with testaceous; sub-genital lamina asymmetrical bordered on either side by lappets, the inflexed margins of the 9th tergite, the left lappet with apex slightly produced, the right style minute, the left stout, hirsute, more or less concealed beneath the lamina. Cerci fuscous, moderate, 9-jointed. Coxae castaneous at base, testaceous at apex; femora castaneous; tibiae flavo-testaceous tipped with castaneous.

Total length 13 mm.; length of body 10.5 mm.; length of tegmina 11 mm.; pronotum 4 mm. \times 4.3 mm.

Hab. GAMBIA (Oxford Mus., type).

Theganopteryx rhodesiae, sp. n.

♂. Testaceous. Head flavo-testaceous; antennae fuscous. Pronotum with two broad castaneous vittae, lateral margins hyaline. Tegmina with 20 costals, 6 longitudinal discoidal sectors, anterior ulnar simple. Wings with marginal field infuscated, mediastinal vein 3-4-ramose, 13 incrassated costals, medio-discal area about twice as broad as the medio-ulnar, crossed by 12 transverse venules, ulnar vein bifurcate, upper half of triangular apical area crossed by two veins, 1st axillary 3-ramose. Abdomen fuscous with pale lateral margins. Supra-anal lamina rounded, surpassed by the subgenital lamina which is produced and symmetrical; styles absent. Cerci piceous, situated close together at base. Legs testaceous.

♀. Similar, but in some examples the tegmina and wings do not extend beyond the apex of the abdomen. Supra-anal lamina trigonal, sub-genital lamina semi-orbicular ample.

Total length (♂) 9 mm., (♀) 7-9 mm.; length of body (♂) 8 mm., (♀) 8 mm.; length of tegmina (♂) 9 mm., (♀) 7-9 mm.; pronotum 2-5 mm. \times 3 mm.

N.E. RHODESIA, shores of L. Bangweolo and Upper Kalungwisi valley (*S. A. Neave*) (Oxford Mus., types).

Theganopteryx notata, sp. n. (Plate LXXIX, fig. 5.)

♂. Head testaceous, antennae fuscous, setaceous, distance apart of eyes on vertex of head less than length of 1st antennal joint. Pro-

notum testaceous with 2 broad fuscous vittae. Tegmina and wings exceeding the apex of the abdomen. Tegmina castaneous, the marginal field and the apex of the anal field testaceo-hyaline, 14-16 costals, radial and anterior ulnar veins simple, 6 longitudinal discoidal sectors. Wings suffused with castaneous, mediastinal vein 3-ramose, 14 costals the first 8 incrassated, medio-distal area in middle about 3 times broader than medio-ulnar area, crossed by 12 transverse venules, ulnar vein bifurcate, the rami sometimes reuniting at their apices, triangular apical area large and conspicuous, 1st axillary 4-ramose. Abdomen castaneous above, laterally margined with testaceous, beneath testaceous, laterally margined with castaneous. Scent-gland opening on 7th abdominal tergite; supra-anal lamina bullate, apex emarginate with a small tuft of rufous hairs on either side of the notch; surpassed by the sub-genital lamina which is symmetrical, produced, with the apex emarginate, right style minute, left style stouter, curved, median in position. Cerci moderate, 8-jointed. Legs testaceous.

♀. Similar, supra-anal lamina trigonal.

Total length 9-10 mm.; length of body 9 mm.; length of tegmina 8-8.5 mm.; pronotum 3-5 mm. × 4 mm.

Hab. FRENCH CONGO, Ndjole, Lambarene, Fernand Vaz (*L. Fea*) (Genoa Mus., types; Oxford Mus.).

Theganopteryx lucida, Br. (Plate LXXIX, figs. 6 and 7.)

Ectobia [*Theganopteryx*] *lucida*, Brunner von Wattenwyl, *Nouv. Syst. Blatt.*, p. 62 (1865).

♂. Rufo-testaceous. Distance apart of eyes on vertex equal to length of 1st antennal joint. Pronotum with 2 broad fuscous vittae, occasionally obsolescent. Tegmina and wings exceeding the apex of the abdomen. Tegmina suffused with castaneous near the base, 17-20 costals, radial and anterior ulnar veins simple, 5-6 longitudinal discoidal sectors. Wings with the veins castaneous, mediastinal vein 4-ramose, 12-14 costals, all but the last 2 or 3 incrassated, medio-discal area in middle 3 times broader than the medio-ulnar area crossed by about 15 transverse venules, ulnar vein bifurcate, the rami reuniting at their apices, triangular apical area large and prominent its upper half crossed by 2 venae spuriae, 1st axillary 5-ramose. Opening of scent-gland on 7th abdominal tergite; supra-anal lamina triangular, sub-truncate at apex; sub-genital lamina asymmetrical, notched to the left of the middle line, left style long and slender, right style absent. Femora as in the preceding species.

♀. Similar; supra-anal lamina trigonal; tegmina more heavily suffused with castaneous.

Oötheca chitinous, carried with the suture uppermost, sides and base multicarinate, the carinae produced posteriorly to form minute teeth.

Total lengths 10 mm.; length of body (♂) 9 mm., (♀) 8 mm.; length of tegmina 8.5 mm.; pronotum 3 mm × 3.5 mm.

Hab.? KAMERUN (Stettin Mus., type; coll. Bolivar; Berlin Mus.); FRENCH GUINEA, Kouroussa (Paris Mus.); PORTUGUESE GUINEA, Bolama, Rio Cassine (*Fea*) (Genoa Mus., Oxford Mus.); FERNANDO PO, Basilé (*Fea*) (Genoa Mus.); BIAFRA, Cabo S. Juan (*Escalera*) (Madrid Mus.); CONGO STATE, Kasenga Kalumba (*Sheffield Neave*) (Musée du Congo).

One of the Portuguese Guinea examples was found in a Termites' nest. The Biafra specimens are much darker than those from other localities; in the Kamerun examples the pronotal vittae tend to become obsolete.

iii. DIAGNOSIS OF HEMITHYRSOCERA, Sauss. (Sub-family *Pseudomopinæ*).

Sexes similar or dissimilar.

Vertex of head not covered by the pronotum. Antennae setaceous but occasionally incrassated or plumose. Pronotum trapezoidal, posteriorly produced obtusely. Tegmina and wings in ♂ always exceeding the apex of the abdomen; in the ♀ the tegmina and wings resemble those of the ♂, or in a few species the tegmina are reduced to quadrate lobes and the wings are rudimentary. Discoidal sectors of tegmina longitudinal. Ulnar vein of the wing simple, bifurcate, or rarely trifurcate; apical triangle variable but usually much longer than broad and with ill-defined boundaries, not cutting off the apex of the ulnar vein from the outer margin of the wing. Medio-discal and medio-ulnar areas narrow. Subgenital lamina of the ♂ and styles usually very asymmetrical. Femora strongly armed, front femora armed after Type A. Oötheca a membranous or coriaceous capsule carried with the suture on one side.

Type of the Genus: *Thyrsocera histrio*, Burm.

Geographical distribution—The tropical and sub-tropical regions of the world.

Every variation of which the apical triangle of the wing seems capable is presented in this genus; it may be very narrow and almost inconspicuous (e.g. *histrio*, Burm.,

fallax, Sauss., *massuac*, Sauss. and Z., *sabauda*, Giglio-Tos), and when in this form the type of wing-structure approaches that of *Blattella* very closely. The other extreme causes the wing-structure to resemble that of *Theganopteryx* (e. g. *circumcincta*, R. and F., *nearvei*, sp. n.) and every gradation may be found between the two extremes if a large enough number of species is examined. As a matter of fact the apical triangle is not a character of the first importance, its form appears to be correlated with the relative length and breadth of the wing, which again depends largely on the body-length; the longer the wing the narrower and the more ill-defined the apical triangle is a general rule, with of course many exceptions, and the converse holds true also.

The species described below are either new to science or else of considerable interest as having long occupied very precarious situations in classification; the synonymy of *H. circumcincta*, R. and F., is a good example of the latter.

Finally I give a list of the species of *Hemithyrsocera*, and it will be noted that I have transferred to it some species from the old "portmanteau" genus *Phyllodromia*, Serv., and also some species which in my "Genera Insectorum" memoir (*Ectobiinae*) I placed in *Theganopteryx*. Concerning these latter species I shall doubtless be accused of chopping and changing, but in palliation of my offence can only urge that my predecessors appear to have held as vague and uncertain views of the limits of the two puzzling genera discussed in this paper as I did until recently. It was not till I had critically examined a large number of type-specimens that I was able to gain a clear picture of the two genera. That being done I now hope that the views expressed here are quite final and decisive, and that there will no longer be confusion between the two genera.

A word may be said in passing on the genus *Pseudectobia*, Sauss. Originally erected to include the species with a conspicuous apical triangle and multiramose vena ulnaris alarum as opposed to the simple ulnar vein of *Theganopteryx*, it gradually came to include a number of most diverse species and its boundaries became so elastic that they could not be defined with accuracy. Later, de Saussure, in his work on the Orthoptera of Madagascar, regarded *Pseudectobia* as a mere sub-genus of *Theganopteryx*, but to adopt this view involves the removal of the type species *P. luneli*, Sauss., from the genus! *P. luneli* is unfortunately

known from but a single specimen in a shocking state of preservation. I have made as careful an examination of the dilapidated type as is possible, and find that the apical triangle is not at all conspicuous, and its boundaries are ill-defined; the femora are sparsely armed and the discoidal sectors of the tegmina so far as can be seen are longitudinal, but this latter point is exceedingly doubtful, owing to the damage sustained by the tegmina. In my opinion none of the other species included by different authors in this genus are congeneric with *luneli*, and for the present I prefer to regard *Pseudectobia* as a monotypic genus.

iv. DESCRIPTIONS OF SOME SPECIES OF HEMITHYRSOCERA.

Hemithyrsocera massuac, Sauss. and Zehntner. (Plate LXXIX, fig. 8, LXXX, fig. 9, compare also fig. 10.)

Blatta massuac, Saussure and Zehntner [*in*] Grandidier's Hist. Madagascar, Orth. i, p. 28 (1895).

♂. Flavo-testaceous. Head rufo-castaneous, eyes on vertex wide apart; antennae testaceous. Pronotum anteriorly and laterally margined with sub-opaque testaceous. Tegmina and wings barely exceeding the apex of the abdomen. Tegmina with 14-16 costals, radial-vein bifurcate from the middle, anterior ulnar bifurcate, 6-7 longitudinal discoidal sectors. Wings hyaline, veins flavous, mediastinal vein 2- or 3-ramose, 10 incrassated costals, radial vein bifurcate from middle, medio-discal area about 3 times broader than medio-discal, ulnar vein simple, triangular apical area moderately distinct, 1st axillary 3-ramose. Supra-anal lamina triangular, exceeded by the sub-genital lamina; opening of scent-gland on 7th abdominal tergite. Sub-genital lamina symmetrical, produced at apex to form a rounded and slightly deflected lobe, right style minute, left style large and shaped like a horseshoe. Cerci moderate, 9-jointed. Femora rather sparsely armed.

Total length 10.5 mm.; length of body 9 mm.; length of tegmina 8.5 mm.; pronotum 3mm. × 3.2 mm.

Hab. ABYSSINIA, Massowa (Geneva Mus., type); ERYTHRAEA, Mt. Geleb (Geneva Mus.).

Through the kindness of Dr. J. Carl of the Geneva Museum I have been permitted to examine one of de Saussure's specimens; it is evident that the learned Swiss entomologist overlooked the very remarkable genital styles of this species.

Hemithyrsoeera circumcincta, Reiche and Fairm. (Plate LXXX, figs. 11-13.)

Blatta circumcincta, Reiche and Fairmaire, [*in*] Ferret and Galinier, Voy. Abyss., iii, p. 241, pl. 27, f. 3 (1847).

Blatta senegalensis, Saussure, Rev. Zool. (2), xx, p. 354 (1868).

Ectobia (*Theganopteryx*) *senegalensis*, Saussure, Mém. Soc. Sc. Phys. Nat. Genève, xx, p. 231 (1869).

Blatta fulvipes, Walker, Cat. Blatt. Brit. Mus., p. 105 (1868).

Blatta amoena, Walker, *t. c.*, p. 220 (1868).

Phyllodromia pulchella, Gerstaecker, Mitt. Ver. Neuvorpomm. u. Rugen, xiv, p. 61 (1883).

Theganopteryx senegalensis, var., Saussure, Ann. Mus. Civ. Genova, xxxv, p. 71 (1895).

Theganopteryx aethiopica, Saussure, *t. c.*, p. 72 (1895); Shelford, Gen. Insect. 55^{me} fasc., Blattidae, Ectobinae, plate, f. 1 (1907).

? *Temnopteryx abyssinica*, Saussure and Zehntner, [*in*] Grandidier, Hist. Madagasc., Orth., i, p. 51 (1895); Saussure, Abh. Senckenb. Ges., xxi, p. 576 (1899); Shelford, Gen. Insect., 73^{me} fasc. Blattidae, Phyllodromiinae, pl. 2, f. 3 (1908).

Temnopteryx saussurei, Bolivar, Ann. soc. ent. France, lxvi, p. 292 (1897).

Theganopteryx saussurei, Shelford, Gen. Insect., 55^{me} fasc. Blattidae, Ectobinae, p. 8 (1907); Shelford, [*in*] Sjöstedt's Kilimandjaro-Meru Exped., xvii, 2, Blattodea, p. 14 (1907).

♂. Head piceous; distance apart of eyes on vertex of head equal to length of 1st antennal joint; antennae fuscous to piceous. Pronotum castaneous, margined anteriorly and laterally with testaceous, the margins inwardly sinuate. Tegmina and wings extending beyond the apex of the abdomen. Tegmina rufo-testaceous to castaneous, outer margin hyaline, radial vein bifurcate at its middle or in the distal third, 10-13 costals, anterior ulnar simple or bifurcate, very rarely 3-ramose, 7-8 longitudinal discoidal sectors. Wings hyaline, costal margin faintly suffused with testaceous, mediastinal vein 4-ramose, radial vein bifurcate, 9-10 costals more or less incassated, medio-discal area about twice as broad as the medio-ulnar and crossed by several transverse venules, ulnar vein simple, triangular apical area moderate, well-defined, 1st axillary vein 3- to 4-ramose. Abdomen above and beneath piceous to cas-

taneous, margined laterally with flavo-testaceous, 7th tergite more or less testaceous and bearing the scent-gland opening. Supra-anal lamina trigonal. Sub-genital lamina asymmetrical, margined posteriorly with flavo-testaceous, on either side of it a lappet formed by the inflexed margins of the 9th tergite, the lappets are asymmetrical, the left being produced into a dentiform process beset with spiniform setae, the right obliquely truncate; right style minute, left style stout, covered with long hairs and more or less hidden beneath the lamina. Cerci castaneous, moderate, 9-jointed. Coxae piceous tipped and outwardly marginal with testaceous, femora castaneous or testaceous in basal $\frac{2}{3}$ and castaneous in apical third, tibiae rufo-castaneous tipped with castaneous, tarsi fuscous, with basal joints rufous; femoral and tibial spines rufous. Femora moderately armed, front femora armed according to Type A.

♀. Long-winged form (*aethiopica*); tegmina and wings extending beyond the apex of the abdomen; tegmina castaneous, outwardly margined with testaceous; supra-anal lamina trigonal; apical half of the coxae, basal $\frac{2}{3}$ of the femora, the tibiae except at extreme base and apex, testaceous, remainder of legs castaneous. Medium-winged form (*circumcincta*); tegmina lanceolate, castaneous to rufous, together with the wings not extending beyond the 5th abdominal tergite; fore femora usually piceous, otherwise the legs are coloured as in the long-winged form; supra-anal lamina occasionally faintly emarginate. Short-winged form (*abyssinica*): tegmina quadrate not extending beyond the 1st abdominal tergite, castaneous or rufous; wings squamiform; the legs vary in colour from that described for the medium-winged form to testaceous with traces of castaneous markings at bases of coxae and femora.

♂. Total length 12-13.5 mm.; length of body 10 mm.; length of tegmina 10.5-11.5 mm.; pronotum 3 mm. × 4 mm.

♀. Total length 10-13 mm.; length of body 10-10.5 mm.; length of tegmina 3.4, 7, 10 mm.; pronotum 3 mm. × 4 mm.

Hab. ERYTHRAEA, Asmara (Oxford Mus.), Bogos (*Beccari*) (Genoa Mus.); ABYSSINIA (Ferret and Galinier) (Paris Mus., type of *circumcincta*), Massowa (Geneva Mus., type of *abyssinica*); SHOA, Let Marefia (*Beccari*) (Genoa Mus.); GALLA LAND, various localities (*Bottego*) (Genoa Mus., Geneva Mus.); GERMAN E. AFRICA, Kilimandjaro, Meru (*Sjöstedt*) (Stockholm Mus.; Oxford Mus.); "W. AFRICA" (British Mus., type of *amoena*); SENEGAL (Geneva Mus., type of *senegalensis*); PORTUGUESE GUINEA, Bolama (*Fea*) (Genoa Mus.); SIERRA LEONE (British Mus., type of *fulvipes*); GOLD COAST (Geneva Mus., type of

aethiopica); TOGO, Bismarckburg (*Büttner*) (Berlin Mus.); BIAFRA, Cabo S. Juan (*Escalera*) (Madrid Mus.); KAMERUN, (Griefswald Mus., type of *pulchella*); CONGO, Buta (*Ribotti*) (Genoa Mus.).

This is a most variable species which I am unable to split up even into constant local varieties. The West African male specimens have the tegmina rufo-testaceous and the anterior ulnar vein of the tegmina usually bifurcate, but specimens from Shoa also have the tegmina rufo-testaceous, and the East African males in general sometimes have the anterior ulnar vein simple sometimes branched, so that these characters cannot be employed for subdividing the species. The form of the terminal segments of the abdomen in the male also varies within small limits, but the variations are quite independent of the geographical distribution and in some cases I believe that the variations are really due to distortion of the parts after death. The long-winged females (*aethiopica*) occur only on the West Coast, but they are found side by side with the medium-winged forms (*fulvipes*) which occur also in East Africa; the short-winged forms occur in Abyssinia (*abyssinica*) and also in Togo.

In Dr. Sjöstedt's Kilimandjaro collections was found a short-winged female with the oötheca protruding from the end of the abdomen; this oötheca was a thin-walled membranous sac, carried with the suture directed to one side and transparent so that the eyes of the contained embryos could be seen through the walls. The oötheca, which thus differs very markedly from that of *T. lucida*, Br., is probably deposited but a few hours before the emergence of the young, and is thoroughly characteristic of the sub-family Pseudomopinae.

Hemithyrsocera neavei, sp. n. (Pl. LXXX, fig. 14.)

♂. Differs from *T. circumcincta* in larger size, antennae testaceous at base; tegmina rufo-castaneous sometimes darker at base, 15-18 costals, otherwise venation the same; left inflexed angle of 9th abdominal tergite not dentately produced; legs testaceous, the extreme base of the coxae and tibiae and the apex of the tibiae castaneous.

♀. Very similar to short-winged E. African form of *T. circumcincta* (*abyssinica*) but larger and pronotum not bordered posteriorly with testaceous.

Total length (♂) 15 mm.; length of body (♂) 12 mm., (♀) 13.2 mm.; length of tegmina (♂) 13 mm., (♀) 4 mm.; pronotum 4 mm. × 4.8 mm.

Hab. CONGO STATE, S.E. Katanga, 4,000' (*S. A. Neave*) (British Mus., Oxford Mus.); N.E. RHODESIA, Serenje district, 4,500' (*S. A. Neave*) (British Mus., types; Oxford Mus.).

This is quite distinct from the preceding species.

Hemithyrsocera vinula, Stål.

Blatta vinula, Stål, Oefv. Vet.-Akad. Förh., xiii, p. 166 (1865).

Blatta amoena, Walker, Cat. Blatt. Brit. Mus., p. 229 (1868) (part).

♂. Head and antennae piceous; distance apart of eyes equal to length of 1st antennal joint; antennae slightly incrassated. Pronotum piceous, margined all round with flavo-hyaline. Tegmina and wings exceeding the apex of the abdomen. Tegmina castaneous, the marginal area hyaline, the disc with a darker streak or the base darker than the apex, radial vein bifurcate in posterior third, the lower branch frequently multiramose, 12-15 costals, anterior ulnar vein bifurcate, 7 longitudinal discoidal sectors. Wings suffused with castaneous, mediastinal vein 5-ramose, 7-8 costals which with the mediastinal rami are incrassated, radial vein bifurcate, anterior ulnar vein simple, medio-discal area more than twice as broad as medio-ulnar and crossed by 7 or 8 transverse venules, triangular apical area moderate, divided only by the vena dividens, 1st axillary 4-ramose. Abdomen piceous, margined laterally with testaceous; supra-anal lamina trigonal; scent-gland opening on 7th tergite; sub-genital lamina rather asymmetrically produced, bordered with lappets as in the two preceding species, the left lappet produced. Cerci moderate, piceous. Legs piceous, apices and lateral margins of coxae testaceous, all the spines rufous. Front femora armed according to Type B.

♀. Similar to ♂, but sub-genital lamina semi-orbicular, ample, supra-anal lamina triangular.

Total length (♂) 11 mm., (♀) 12 mm.; length of body (♂) 9 mm., (♀) 10 mm.; length of tegmina (♂) 8.9 mm., (♀) 10.2 mm.; pronotum 2.8 mm. × 3.4 mm.

Hab. NATAL (Stockholm Mus., type; British Mus.); PORTUGUESE E. AFRICA, Beira (S. African Mus.); N.E.

RHODESIA, Loangwa R. (*S. A. Neave*) (Oxford Mus.)
CONGO, Katanga and Lualaba R. (*S. A. Neave*) (British Mus.), Umangi (*Wilwerth*) (Brussels Mus., Oxford Mus.).

Hemithyrsocera nigerrima, sp. n.

♀. Closely allied to *H. vinula*, but the antennae not incrassated; tegmina uniform piceous except for a narrow marginal band which is testaceous and extends throughout the entire length of the tegmina; radial vein of wing simple; tarsi testaceous.

Total length 10.5 mm.; length of body 9.2 mm.; length of tegmina 9 mm.; pronotum 2.8 mm. × 3.5 mm.

Hab. KAMERUN, Jaunde-Stat (Berlin Mus., type).

Hemithyrsocera ridleyi, sp. n. (Pl. LXXX, fig. 15.)

♂. Flavo-testaceous. Antennae setaceous, testaceous; eyes widely separated on vertex of head. Pronotum widely trapezoidal, margins hyaline. Tegmina and wings exceeding the apex of the abdomen. Tegmina with 19 costals, radial vein bifurcate from the middle, anterior ulnar bifurcate, 7 discoidal sectors. Wings hyaline, mediastinal vein 4-ramose, 16 costals slightly incrassated, radial bifurcate from the middle, medio-discal area about $2\frac{1}{2}$ times broader than medio-ulnar, ulnar vein simple, discal area crossed by numerous transverse venules, triangular apical area moderate, distinct. Abdomen above banded with fuscous, no scent-gland visible, supra-anal lamina shortly triangular, apex sub-truncate. Sub-genital lamina extremely asymmetrical, on the extreme left a blunt curved process, on the inner side of this another blunt process tufted with stiff brown hairs, the rounded apex of the lamina fimbriate, the left style small situated to the right of the apex, the right style a large sinuose structure. In addition there appear under the supra-anal lamina a pair of bifurcate and denticulate processes which apparently are not connected with the gonapophyses. Cerci 12-jointed, of moderate lengths, apex acuminate. Femora very strongly armed (front femora missing).

Total length 13 mm.; length of body 12 mm.; length of tegmina 12 mm.; pronotum 3 mm. × 4 mm.

Hab. SINGAPORE, Botanic Gardens (*H. N. Ridley*), (Oxford Mus., type).

The complicated nature of the secondary sexual apparatus of this species is highly remarkable.

V. LIST OF THE SPECIES OF HEMITHYRSOCERA.

ORIENTAL SPECIES.

- H. histrio*, Burn.
H. palliata, Fab. (= *nigra*, Br.).
H. soror, Br.
H. suspecta, Bol.
H. ferruginea, Br.
H. communis, Br.
H. lateralis, Walk.
H. ignobilis, Shelf.
H. vittata, Br.
H. fuliginosa, Br. (from *Phyllodromia*).

* *H. curvinervis*, S. & Z. (from *Phyllodromia*).

* *H. irregulariter-vittata*, Br. (from *Phyllodromia*).

* *H. marmorata*, Br. (from *Phyllodromia*).

H. ridleyi, Shelf.

ETHIOPIAN SPECIES.

H. circumcincta, R. & F.

H. neavei, Shelf.

H. vinula, Stål.

H. nigerrima, Shelf.

H. testacea, Shelf.

H. sabauda, Gig. Tos.

H. massuae, S. & Z.

H. brachyptera, Adel (from *Mallotoblatta*).

H. kraussi, Adel (from *Mallotoblatta*).

H. patricia, Gerst (from *Phyllodromia*).

NEOTROPICAL SPECIES.

H. fallax, Sauss. (from *Theganopteryx*).

H. pilosella, S. & Z. (from *Theganopteryx*).

DOUBTFUL SPECIES.

H. tessellata, Rehn.

H. australis, Tepp.

H. apicigera, Walk.

* If eventually the genus *Hemithyrsocera* becomes overcrowded, these species can be put into a separate genus, the diagnostic character being the tri-ramose ulnar vein of the wings.

EXPLANATION OF PLATES LXXIX, LXXX

[See Explanation facing the PLATES.]